1. **Solution by J. W. NICHOLSON, A. M., LL. D., President and Professor of Mathematics, Louisiana, State University and Agricultural and Mechanical College, Baton Rouge, Louisiana.**

The series is evidently the sum of the following series:

(a)	1	1	1	1	1	1	1	1	1	1	. . . .
(b)			1	2	3	4	5	6	7	8	. . . .
(c)					1	3	6	10	15	21	. . . .
							1	4	10	20	. . . .
									1	5	. . . .
											. . . .
											. .

The nth term of (a) is 1; the $(n-2)$th term of (b) is $n-2$; the $(n-4)$th term of (c) is $\frac{(n-3)(n-4)}{2}$; the $(n-6)$th term of (d) is $\frac{(n-4)(n-5)(n-6)}{6}$; etc.

Therefore the nth term of the given series is

$$1+(n-2)+\frac{(n-4)(n-3)}{2}+\frac{(n-6)(n-5)(n-4)}{2.3}+\frac{(n-8)(n-7)(n-6)(n-5)}{2.3.4}$$

$+\ldots.$ to 0.

Again, the sum of n terms of (a) is n, of $n-2$ terms of (b) is

$$\frac{(n-2)(n-1)}{2}, \text{ of } n-4 \text{ terms of } (c) \text{ is } \frac{(n-4)(n-3)(n-2)}{2.\ 3}, \text{ etc.}$$

Therefore, the sum of n terms of the given series is

$$n+\frac{(n-2)(n-1)}{2}+\frac{(n-4)(n-3)(n-2)}{2.3}+\frac{(n-6)(n-5)(n-4)(n-3)}{2.3.4}+\ldots.\text{to } 0.$$

PROBLEMS.

42. **Proposed by ALEXANDER MACFARLANE, A. M., Sc. D., LL. D., Cornell University, Ithaca, New York.**

There are p electors and q candidates for r seats. Each elector has r votes, and he may distribute them as he pleases among the candidates. Find in how many different ways the voting may result, that is, the number of possible states of the poll.

43. **Proposed by F. M. SHIELDS, Coopwood, Mississippi.**

Four men, A, B, C, and D, start from the same place, the traveling rates of A and C are equal, and the traveling rates of B and D were as 17 to 18, respectively: B could travel one mile in 7 minutes and 12 seconds. A traveled *due* west a certain distance, B traveled *due* north the cube of A's distance *plus* his distance; C traveled *due* east a certain distance, and D traveled *due* south the cube of C's distance *plus* his distance: They all change directions, and A traveled *due* north a certain distance, B traveled *due* east the 5th power of A's distance north; C traveled *due* south a certain distance, and D traveled *due* west the 5th power of C's distance south,–when it was found that the sum of the north and south distances traveled by B and D was 351090 feet, and the sum of the distances B and D traveled east and west was 5929200000 feet, and that the product of the distances that A and C traveled east and west *plus* the square of the difference of these distances, *plus one* was 3901; and

that the product of the distances that A and C traveled north and south *plus* the square of the difference *squared*, plus the product multiplied by the square of the difference, was 49410000 [equal to the following new formulas: $(nn+d^2+1)=3901$, and $\{(nn+d^2)^2+(nn\times d^2)\}=49410000$]. How far on a line is each party from the starting place, and how long did it require for B and D each to make the entire trip from starting place to the end?

[The Proposer says:"A city lot at St. Andrews, Florida, will be given to the party sending the EDITOR the first correct answer to the above problem-No.43].

GEOMETRY.

Conducted by B. F. FINKEL, Kidder, Mo. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

25. **Proposed by L. B. FRAKER, Weston, Ohio.**

The sides of a quadrilateral board are $AB=7$ inches, $BC=15$ inches, $CD=21$ inches, and $DA=13$ inches; radius of inscribed circle is 6 inches. (1) What are dimensions of the largest rectangular board that can be cut out of the given board, (2) largest square, (3) largest equilateral triangle? (Please solve without use of the calculus.)

II. **Solution by Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.**

From the solution of this problem on page 354, No. 10, Vol., I., we find for another set of values for the angles, $A=112°\ 37'\ 11''$, $B=126°\ 52'\ 12''$, $C=53°\ 7'\ 38''$, $D=67°\ 22'\ 49''$. This demonstrates that AB and CD are parallel. Since CD is the longest side and also parallel to AB, one side of the rectangle and square will coincide with DC. Let KI and HI be the sides of the rectangle.

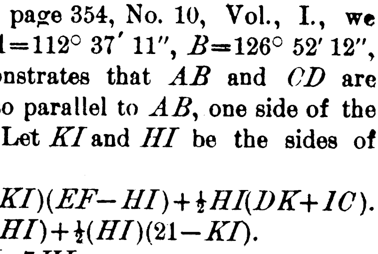
Then $\frac{1}{2}(AB+DC)\times EF=KI\times HI+\frac{1}{2}(AB+KI)(EF-HI)+\frac{1}{2}HI(DK+IC)$.

$\therefore\ \frac{1}{2}(7+21)\times12=KI\times HI+\frac{1}{2}(7+KI)(12-HI)+\frac{1}{2}(HI)(21-KI)$.

$\therefore\ 126=6KI+7HI$. For a maximum $6KI=7HI$.

$\therefore\ HI=9$ inches, $KI=10\frac{1}{2}$ inches.

$\therefore\ GHIK$ is the rectangle.



For the square $KI=HI$.

$\therefore\ 126=13KI$, $\therefore\ KI=9.692+$inches.

$\therefore\ LMNP$ is the square.

For the triangle, draw DR making the angle $RDC=60°$.

Then $DR^2=EF^2+\frac{1}{4}DR^2$.

$\therefore\ \frac{3}{4}DR^2=144$, $DR^2=192$, $DR=13.856$ inches.

$\therefore\ DRS$ is the triangle.

The above solution is the result of suggestions from the Proposer.